

## Development of Goods Circulation under the Influence of Digitization and Technological Transformations

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### Abstract

*Development of goods circulation sphere is characterized at present both as trend-predicative and, at the same time, as hyperconversive process under modern conditions of economy digitization. The significance of circulation sphere and, hence, directions of its transformation increases with increase in goods supply, expansion and deepening of assortment of consumer goods, development of production and reproduction process. Changes in purchase model of final consumers (B2C, C2C, O2O), B2B procurement mechanisms exert obvious impact on formation of modern goods circulation sphere, including the frames of e-trading segment. Digitization and technological development of global scale transform without exclusion all life spheres of the world's population, all sectors of world economy, and directly or indirectly influence numerous processes. Innovative activity of participants in goods circulation sphere is determined by the factors of implementation of digital technologies in all processes of goods supply both at macro- and at mesolevels. It is quite obvious that for transformation and improvement of competitiveness of both single companies and whole industries, the most important significance under the modern conditions is their active interaction (integration and accompanying participation in the chains of goods circulation sphere) with hi-tech rapidly developing segments. Implementation of digital technologies will promote development of trading, significant increment in the share of online trading, modification of circulation structure in offline–online trading. This article discusses the trends of development of trading, e-trading in the Russian Federation, the development dynamics are described, the factors of digitization and technological development of various segments of national economy are formulated, as well as their influence on goods circulation sphere. Proliferation of globalization, including information one, determines nowadays the trends of transformation of consumer demand, formation of supply under the conditions of digital economy. Analysis of such trends has determined development of multiplicative model of influence of factors of digitization and technological development on goods circulation sphere.*

**Key-words:** Digitization, Technological Development, Sphere Of Circulation, Factor Model of Digitization and Technological Development, E-Trading, Digital Economy.

## 1. Introduction

Digital economy, which integrates transformation of technological processes, including those in goods circulation, forms increment in all macroeconomic indices. Digital technologies build new model of goods supply with consideration for unconditional globalization of trading [20, 22]. Implementation of new technologies, including analysis of position of Russia in the field of development of digital technologies, is estimated by a set of international indices [21]. KOF-TrGI of the Russian Federation is 47.8. The maximum values are demonstrated by Singapore: 96.4, UAE: 89.7, the Netherlands: 89.6. The indices of other countries are as follows: China: 48.9, Austria: 82.1, Belgium: 88.0, Greece: 83.9, Germany: 78.9, France: 71.7, Finland: 79.2, Great Britain: 73.4, the USA: 56.8. The minimum values of KOF-InGI are indicated in Kongo: 22.7, Iran: 22.6, Sudan: 21.4. KOF-InGI in Russia is 79.5. The maximum values are detected in Luxemburg: 98.1, Lichtenstein: 96.9, Canada: 96.2. The KOF-InGI in China is about 77.7, UAE: 82.2, Austria: 88.3, Belgium: 90.6, Greece: 82.1, Germany: 92.9, France: 88.7, Finland: 88.5, Great Britain: 94.1, the USA: 95.5. The minimum KOF-InGI are in Chad: 46.8, Kongo: 45.0, Somali: 36.2 [19]. According to estimations by ICT Data [28], in terms of gender in the Russian Federation this index for male population is 81.8%, for female population – 80.1%. This factor is of significant importance with consideration for state religion. Thus, the Christian population does not make significant gender differentiation between Internet users contrary to the Islamic countries. In Great Britain there are 94.5% of male Internet users, and 95.3% of female users, in Switzerland – 90.9% and 88.5%, respectively. Herewith, in Turkey there are 80.4% of male users and 67.6% of female users.

Integral studies of e-commerce development with accounting for globalization include estimation of dynamics of revenue increment of the companies carrying out business in e-segment in the Internet space of the Russian Federation during the first half of 2020 and 2019. According to the data by the Association of Internet Trade Companies (AITC) [27], the share of online sales in total retail turnover was 10.9% (the first six months in 2020). The internal segment of e-commerce accounted for 84%, or RUB 1.386 trillion, the transborder trading – 16%, or RUB 268 billion, in the first half of 2020. In regional aspect, the results were as follows: Moscow formed 29.2% of local market and 26.64% of transborder market of e-trading in terms of price, St. Petersburg – 7.82% and 7.86%, respectively. Moscow Oblast provided 6.5% of internal online trading and 7.73% of transborder trading. Mega-top category of goods in 2019 was digital and home appliances (nearly one

third of the market); however, in the pandemic environment, in the first half of 2020 the first category of e-commerce in terms of turnover was formed by clothes and shoes: RUB 417.9 billion in six months. The leader of online sales in 2019 (as in 2018) was Wildberries company with goods turnover equaling to RUB 210.6 billion [29]. The turnover of the retailer of electronics and home appliances, Citilink, was RUB 90.42 billion. The trend of reduction in the average check was demonstrated by Ozon company: 7%; herewith, the average purchase price in this e-shop was significantly higher and amounted to RUB 2.5 thousand. In 2019 Ozon.ru demonstrated the e-sales in amount of RUB 80.7 billion. Total amount of turnover of the first 20 companies in the sector of e-commerce was RUB 833.27 billion in the last year, which was by 1.5 times higher than the previous estimations. Quantitative increment of orders was detected by the experts in e-commerce, total amount of orders of Top-20 trading companies formed the index of higher than 285 million orders, which was by 1.86 times higher than in LFL analysis. The authors of the article formulated the following tasks: estimation of development of e-trading in Russia and in the world; generation of model of factors of digitization and technological development, influencing the development of goods circulation sphere; development of multiple factor model of such influence.

The aim of this research was estimation of the influence of digitization and technological development on the Russian turnover sphere as well as development of multifactor model for subsequent development of competitiveness strategies.

## **2. Formulation of the Problem**

The aspects of expressed influence of factors of digitization and technological development on goods circulation sphere in scientific and practical spheres are undebatable. Herewith, the extent and vector of influence can exist in differentiated planes of researchers' opinions. Thus, digitization can be presented as integration of data management technologies, analytics management, visualization management into all sectors of national economy.

Implementation of digital technologies a priori becomes the driver of economic development of developing countries. Digitization influences structural changes of economy, sectoral efficiency, development of goods circulation sphere, development of infrastructure, positioning of developing countries in global markets [10]. Foreign trade turnover increases due to increase in export from developing to developed countries. There is no reverse relation. In addition, the experimental results

demonstrate that the increasing index of penetration of global information networks, the index of wideband networks in Ghana, Kenya, Mauritania, Nigeria, Senegal, Tanzania lead to increase in export from these countries [10]. Such transformations modify global international trade relations, including those based on denationalization of competitive advantages [7]. Digitization of world trading allows to arrange the strategy of competitiveness on the basis of maneuvering assortment policy. Herewith, globalization of world trading enhances exchange with digital technologies, which predetermines high rate and extent of development of digital world economy.

Reduction of transaction expenses due to global digitization forms economic integration of isolated territories [6]; herewith, the coefficient of integration is discounted by the index of factor impact of technological development on the economy of such locations [10]. Nowadays smart production means development of working platform, where employees, equipment, corporate systems and devices are connected with each other by cyber hardware as well as with joint network [13]. The amount of data generated by the systems of commercial production has increased and, as expected, will be increasing. The increase in computing capacity forces companies to make more substantiated decisions, which is reflected conceptually in retail business processes [25].

The concept of smart production is developed from simple digitization and automation of single machines to connection of machines using IoT technologies and data from connected systems in order to adopt decision online. Lean manufacturing aimed at improvement of customer servicing and reduction of production wastes [4] is considered as one of the most popular process control systems [3]. However, the implementing companies could gain profits only when internal efforts of improvement were related with external interested parties, i.e., suppliers and consumers [2]. Similar to lean implementation in supply chains, digitization of processes is obligatory for supply chains, especially when they are aimed at actual profits [16]. The available publications devoted to the Industry 4.0 pay high attention to various technologies, such as IoT, AI, ML and data analytics [15] in terms of production. However, there are few publications about interaction of advanced technologies in the supply chains [5, 9]. Most publications devoted to supply chains regarding the Industry 4.0 concept or smart production were focused on theoretical or conceptual models of implementation. However, few works reflect empirical point of view regarding this phenomenon [14]. Since the Industry 4.0 concept in the supply chain is still at initial stage, the relevant publications reflect stepwise implementation of this concept in multilevel supply chain.

The studies allow to substantiate the changes of conceptual model of digital behavior of customers during digital transformation. The digital consumers are in the center of their own ecosystems adapted to their specific demands [7, 11]. Herewith, using certain elements of digital environment, they create digital footprint used by other participants in the social economical system. Therefore, the key factors of digitization, influencing goods circulation sphere [17], are development of world digital economy in the concept of sustainable development, development of digital economy of the Russian Federation in the frames of the developed model, development of national information and communication technologies; involvement of the country in world information and communication process, trading digital globalization; market globalization, information technologies (direct technologies; modification, updating of technologies; rate of implementation [1]); development of presentation technologies (visualization, specifications, trying on, etc.) of goods, technologies of ordering, payments, delivery, assortment management, new business models based on information technologies [11]; informatization of society, formation of global information and communication environment (e-trading and digital economy, acceleration of globalization), etc.

Technological development, efficient and high-quality updating of the existing industrial and business processes on the basis of integrated implementation of advanced innovations generate digital engineering [12]. The key business tasks of the Industry 4.0 concept are translated into the Logistics 4.0, Shop 4.0, which form digital technological sphere of goods turnover. Exactly these transformations allow to develop innovation strategies of competitiveness of trading companies. Adaptation of updated business processes to key requirements of digital economy takes into account the basics of operation of various interdisciplinary systems and process chains, which allows to solve efficiently the occurring issues of goods turnover [12]. The factors of technological development in the goods circulation sphere are as follows: transformation of goods supply system both at the level of transnational and at the level of internal trading, transformation of trading technology (including occurrence of determining pulse of formation of goods supply: demand from final consumer), significant decrease in the role of intermediate link in goods supply system, technological development of logistics processes, development of trading and industrial integrations modifying the business model of goods supply, establishment of cooperation among trading companies, application of energy saving technologies at all stages of goods circulation, transformation of transnational trading, transformation of transborder trading (including e-customs), increase in labor resource efficiency, provision of efficient fixed assets for the segment (estimated in terms of the index of

capital/labor ratio), updating of fixed assets on the basis of estimation of their deterioration, activity of investments into fixed assets aimed at retrofitting and updating (dynamics, amount, structure, share of investments), etc. [23]

Introduction of nanotechnologies and biotechnologies, improvement of soil fertility systems, development of substitutes of agricultural raw stuff form a new segment of food products with preset consumer properties and controlled prime cost together with partially retail cost [26.]. Technological development of agriculture and industry promotes increase in the rates of increment of produced items, rates of increment of import substitution, formation of demand for new goods, modification of the existing structure of commodity markets [26]. Technology of gene modification forms new steady segment of world commodity market, point farming, IoT, agricultural robots, drones transforming production processes, which allows to decrease ex-factory prices as well as sales prices for final consumers.

### **3. Methods**

Aiming at prediction of development of circulation sphere in the Russian Federation with consideration for the factors of digitization and technological development, it is proposed to use the procedure based on the index of technological development of regions, which is calculated with accounting for the coefficient of predicted technological development (under the influence of macrofactors: implementation of hi-tech products into GDP, updating of fixed assets in trading, share of machinery and equipment in total fixed assets in trading, the degree of fitness of fixed assets in trading; innovation factors: the degree of investment implementation aiming at retrofitting and updating in total investments to fixed assets, the depth of investments into machinery and equipment in total investments to fixed assets aimed at retrofitting and updating; factors of statistics of science, innovations and advanced production technologies: internal investment extent for investigations and development in GDP, internal investment rate for investigations and developments on prioritized development trends of science and technology in total amount of internal expenses for investigations and developments, the depth of implementation of technological innovations, share of innovative goods, works, services in total amount of shipped goods, works, services and coefficient of inventive activity); as well as with accounting for dynamics of labor efficiency in trading, capital/labor ratio in trading, return on assets in trading, efficiency indices of resources in trading, accounted for a given

region, including those determined by formed regional statistics, investments into fixed assets aimed at retrofitting and updating, investments into machinery and equipment during retrofitting and updating.

Aiming at formation of consistent picture, let us describe the prediction procedure. The final results are based on the following:

1. The index of predicted technological development of region is calculated as functional product of trading turnover increment with the step of -1, coefficient of predicted depth of technological development and coefficient of predicted increment of indices of technological development.

$$Tfj = Ij * Kfj * Dfj \quad (1)$$

where  $Tfj$  is the rate of increment of trading turnover for the planned period, %;  $Ij$  is the average annual increment of trading turnover of the  $j$ -th region for the last five periods of the analysis, %;  $Kfj$  is the coefficient of predicted technological development of the  $j$ -th region;  $Dfj$  is the coefficient of predicted increment of the indices of technological development of the  $j$ -th region.

The coefficient of predicted technological development is the integral index accounting for the factors, which exert both positive influence on technological development in whole country and in particular regions, and negative influence expressed in deceleration of trading development due to certain reasons.

2. The coefficient of predicted technological development of the  $j$ -th region ( $Kfj$ ) is calculated as the integral index of influence of three groups of factors on development of goods circulation sphere of regions with accounting for elasticity of trading turnover and costs of innovations.

$$Kfj = \frac{\sqrt[3]{K1j * K2j * K3j + 100}}{100} * Ec \quad (2)$$

The choice of coefficients of the influence is stipulated by the system of estimations of technological development of national economy sectors formed by the Federal State Statistics Service.

Firstly, it is necessary to account for the integral index characterizing macroeconomic statistics of technological development.

$$K1j = \sqrt[4]{m1j * m2j * m3j * m4j * mnj} \quad (3)$$

This index ( $K1j$ ) accounts for the following indices of macroeconomic statistics:

1)  $m1$  is the share of hi-tech products in GDP, %;

- 2)  $m_2$  is the coefficient of updating of fixed assets in trading, %;
- 3)  $m_3$  is the share of machinery and equipment in total fixed assets in trading, %;
- 4)  $m_4$  is the fitness factor of fixed assets in trading, %;
- 5)  $m_n$  is the factor of technological development measured by the index, %.

$i$  is the number of indices of technological development accounted for a given region, including those determined by formed regional statistics.

Secondly, it is necessary to account for the integral index characterizing statistics of investments.

$$K_{2j} = \sqrt[2]{c_{1j} * c_{2j} * c_{nj}} \quad (4)$$

This integral index ( $K_{2j}$ ) accounts for the following indices:

- 1)  $c_1$  is the share of investments aimed at retrofitting and updating in total investments to fixed assets, %,
- 2)  $c_2$  is the share of investments aimed at machinery and equipment in total investments to fixed assets aimed at retrofitting and updating, %,
- 3)  $c_n$  is the factor of technological development measured by the index, %.

$i$  is the number of indices of technological development accounted for a given region, including those determined by formed regional statistics.

Thirdly, the integral index characterizing the statistics of science, innovations and advanced production technologies is accounted for.

$$K_{3j} = \sqrt[5]{p_{1j} * p_{2j} * p_{3j} * p_{4j} * p_{5j} * p_{nj}} \quad (5)$$

This index ( $K_{3j}$ ) accounts for the following indices of statistics of science, innovations and advanced production technologies:

- 1)  $p_1$  is the share of internal expenses for investigations and developments in GDP, %;
- 2)  $p_2$  is the share of internal expenses for investigations and developments regarding prioritized trends of development of science and technology in total amount of internal expenses for investigations and developments, %;
- 3)  $p_3$  is the share of companies implementing technological innovations in total number of analyzed companies, %;
- 4)  $p_4$  is the share of innovative goods, works, services in total amount of shipped goods, works, services, %;
- 5)  $p_5$  is the coefficient of inventive activity, %.

6)  $p_n$  is the factor of technological development measured by the index, %.

$i$  is the number of indices of technological development accounted for a given region, including those determined by formed regional statistics.

Fourthly, it is required to account for the elasticity coefficient ( $E_c$ ) of trading turnover regarding expenses on innovations.

3. The coefficient of predicted increment of the indices of technological development of the  $j$ -th region ( $D_{fj}$ ) is calculated as the integral index of the influence of two groups of factors on development of goods circulation sphere of regions:

$$D_{fj} = \frac{\sqrt[2]{D_{1j} * D_{2j} + 100}}{100} \quad (6)$$

The choice of coefficients of the influence is stipulated by the system of estimations of technological development of national economy sectors formed by the Federal State Statistics Service.

Firstly, it is required to consider for the integral index characterizing macroeconomic statistics of technological development.

$$D_{1j} = \sqrt[i]{\frac{d_{1j} * d_{2j} * d_{3j} * d_{nj}}{100}} \quad (7)$$

This index ( $D_{1j}$ ) considers for dynamics of indices of macroeconomic statistics, estimating the efficiency of resources in industry:

- 1)  $d_1$  is the index of labor efficiency in trading, %;
- 2)  $d_2$  is the index of capital/labor ratio in trading, %;
- 3)  $d_3$  is the index of return on assets in trading, %;
- 4)  $d_n$  is the index of technological development stipulated by the impact factor, %.

$i$  is the number of indices of usage efficiency of resources in trading accounted for a given region, including those determine by forming regional statistics.

Secondly, it is required to consider for the integral index characterizing the statistics of investments.

$$D_{2j} = \sqrt[i]{q_{1j} * q_{2j} * q_{nj}} \quad (8)$$

This index ( $D_{2j}$ ) considers for dynamics of indices of macroeconomic statistics, estimating the efficiency of resources in industry:

- 1)  $q_1$  is the index of physical amount of investments into fixed assets aimed at retrofitting and updating, %;

2)  $q_2$  is the index of physical amount of investments into machinery and equipment during retrofitting and updating, %;

3)  $q_n$  is the index of technological development stipulated by the impact factor, %;

$i$  is the number of indices of usage efficiency of resources in trading accounted for a given region, including those determined by forming regional statistics.

The procedure of the selected coefficients is based on the system of estimations of technological development of national economy. However, our estimation procedure assumes involvement of other indices, which reflect the factors of digitization and technological development.

#### 4. Results

While predicting, it is important to estimate the rates of trade development in the Russian Federation, to highlight regions with positive and negative dynamics (Table 1). The world economic crisis, the pandemics, the system of restrictions influenced the development of goods circulation sphere. In April 2020, the turnover of retail trading demonstrated drastic negative dynamics (-22.6%). Subsequently, the situation was smoothed: in May 2020, the decrease in the amount of retail trade turnover was 18.6% in comparison with 2019, in June 2020 - 7.1%, in July 2020 - 1.9%. In August 2020, the decrease in retail goods circulation reached nearly 3%, this trend retained in September 2020.

Table 1 - Dynamics of retail trading in the Russian Federation in terms of M2M increment from October 2019 to September 2020 (authors' calculations)

<b>Month of estimation</b>	<b>Rate of increment 2020/2019</b>
October (+1.9%), November (+2.6%), December (+1.8%), January (+2.7%), February (+4.7%), March (+5.7%).	Positive
April (-22.6%), May (-18.6%), June (-7.1%), July (-1.9%), August (-2.7%), September (-3.0%).	Negative

The analysis of the last five years detects the increase in prices of retail trading turnover by 22%, in average by 5.1% per year (in terms of geometrical mean). The rates of increment were as follows: 2.6% in 2016 in comparison with 2015; 5.3% in 2017 in comparison with 2016; 6.2% in

2018 in comparison with 2017; 6.5% in 2019 in comparison with 2018, which evidenced planned predictable growth trend verified by smoothed analytics of the last 20 years. The overwhelming share in formation of the final stage of goods circulation sphere was comprised of trading companies and individual entrepreneurs – 94.7%. Herewith, this share was increasing: from 2015 to 2019 by 3.6% (from 92.1% to 94.7%). The competitiveness is especially high in the sphere of organized trading, in trading networks.

The wholesale trading turnover, reflecting the trends of supply in internal market of the Russian Federation, increased by about 1.5 times. On average, the price of goods turnover increased by 10.4% per year. The rates of increment of wholesale turnover varied as follows: 8.78% in 2016 in comparison with 2015; 12.93% in 2017 in comparison with 2016; 14.47% in 2018 in comparison with 2017; 5.55% in 2019 in comparison with 2018, which evidenced sinusoidal growth. If the scope of estimations was expanded, then the two-fold increase in wholesale turnover would be detected in 2019 (RUB 84.2 trillion) in comparison with 2012 (RUB 42.9 trillion).

Analysis of the amount of retail trading for the last years by the Russian subjects detected the following results with consideration for the year-to-year method (Table 2).

Table 2 - Subjects of the Russian Federation in terms of increment of retail trading turnover  
(Federal State Statistics Service, 2020; authors' calculations)

<b>Subjects of the Russian Federation</b>	<b>Rate of increment, %</b>
Tambov Oblast (0.0), Murmansk Oblast (0.0), Mari El (0.0), Tatarstan (0.0), Arkhangelsk Oblast (-0.5), Nenets Autonomous Okrug (-0.9).	-0.9–0.0
Tver Oblast (4.8), Chuvashia (4.7), Moscow Oblast (4.6), Yakutia (4.6), Leningrad Oblast (4.5), Sakhalin Oblast (3.8), Jewish Autonomous Oblast (3.8), Pskov Oblast (3.5), Adygea (3.4), Tomsk Oblast (3.4), Kamchatka Krai (3.4), Volgograd Oblast (3.1), Omsk Oblast (3.1), Ivanovo Oblast(3.0), Crimea (3.0), Mordovia (3.0), Khakassia (3.0), Krasnoyarsk Krai (3.0), Chukotka Autonomous Okrug (3.0), Kaluga Oblast (2.9), Vologda Oblast (2.7), Novosibirsk Oblast (2.7), Ryazan Oblast (2.6), Lipetsk Oblast (2.4), Kostroma Oblast (2.3), Krasnodar Krai (2.3), Perm Krai (1.0), Altai Krai (1.0), Udmurtia (0.9), Stavropol Krai (0.8), Komi (0.1), Ingushetia (0.1), etc.	0.1–4.9
Altai (9.0), Tuva (6.8), Primorsky Krai (6.3), Irkutsk Oblast (5.0).	More than 5.0

Estimation of indices of technological development for overall industry detected the following. Updating of fixed assets decreased from 8.2% (coefficient of updating) to 7.8% for the last three years. The index of capital/labor ratio increased from 102.5% in 2017 to 108.8% in 2019, which was substantiated by digitization and technological advances in trading. Herewith, return on assets in terms of macroeconomics decreased from 99.2% to 94.5% for the last three years, which was attributed by the management of goods circulation sphere to decrease in expenses for new technologies due to their replications and increased availability of their implementation.

On the basis of predictions by the presented model, it was possible to form groups in terms of increment in retail trade turnover. Thus, the first group was comprised of the subjects of the Russian Federation with predicted negative rate of increment. This included Tambov Oblast with predicted increase by 0.1%. Such high indices were attributed to the implemented policy of attracting investment to the region. Sufficiently high growth of investments was expected in Amur Oblast: by 17.4%. This was an optimistic prediction, though, it was substantiated by the vector policy of support for development of the Far East, expressed in particular by establishment of relevant ministry. This vector exerted influence also on predicted growth of specific weight of investments into GDP in Yakutia by 15.9%.

The second group was the largest of the three: it was comprised of nearly 89% of all subjects with predicted increment from 0.3% to 5.9%. The highest increments, most probably, would be demonstrated by Moscow Oblast, Leningrad Oblast, and Tver Oblast (by 5.5-5.9%). Zero dynamics would be most probably demonstrated by Arkhangelsk Oblast and Nenets Autonomous Okrug. It should be stressed that the trade turnover is affected by other numerous known factors (financial and economical, epidemiological, political, social and demographic, etc.).

Table 3 - Subjects of the Russian Federation in terms of predicted increment of retail trading turnover under the influence of digitization and technological development (Federal State Statistics Service, 2020; authors' calculations)

<b>Subjects of the Russian Federation</b>	<b>Rate of increment, %</b>	<b>Predicted dynamics due to the factors of digitization and technological development, %</b>
Tambov Oblast (0.1), Murmansk Oblast (0.1), Mari El (0.3), Tatarstan (0.2), Arkhangelsk Oblast (0.0), Nenets Autonomous Okrug (0.0).	-0.9–0.0	0.1–0.3
Tver Oblast (5.9), Chuvashia (4.7), Moscow Oblast (5.8), Yakutia (5.6), Leningrad Oblast (5.5), Sakhalin Oblast (3.9), Jewish Autonomous Oblast (3.7), Pskov Oblast (3.9), Adygea (3.5), Tomsk Oblast (4.4), Kamchatka Krai (3.4), Volgograd Oblast (3.1), Omsk Oblast (3.0), Ivanovo Oblast(3.0), Crimea (4.0), Mordovia (3.1), Khakassia (3.1), Krasnoyarsk Krai (4.0), Chukotka Autonomous Okrug (2.0), Kaluga Oblast (4.9), Vologda Oblast (3.7), Novosibirsk Oblast (2.7), Ryazan Oblast (3.6), Lipetsk Oblast (2.4), Kostroma Oblast (2.3), Krasnodar Krai (2.3), Perm Krai (1.0), Altai Krai (1.0), Udmurtia (0.9), Stavropol Krai (0.8), Komi (0.1), Ingushetia (0.1), and others.	0.1–4.9	0.3–5.9
Moscow (9.0), St. Petersburg (8.9)	Higher than 5.0	Lower than 9.0%

## 5. Discussion

There is a debatable issue concerning the number and set of coefficients required for obligatory inclusion into multiplicative factor model of development of goods circulation sphere under the influence of factors of digitization and technological development. In particular, the procedure of Federal State Statistics Service proposes the following indices characterizing technological development of the subjects of the Russian Federation: the number of developed advanced production technologies including new ones for Russia, the number of cardinally new developed advanced technologies, the number of implemented advanced technologies, the number of developed and implemented nanotechnologies, the number of purchased new engineering advances, software. There is a disputable issue about accounting for such indices as the number of technologies, since the economic effect of their implementation can be zero or negative with consideration for deceleration of certain processes due to mastering such technologies, unreadiness and mistakes of personnel. Thus, while implementing the described model into predicting system, it is necessary to underline that the development of goods circulation sphere, hence, the amount of circulation of retail and wholesale trading, significantly depend on numerous factors, which sometimes cannot be quantitatively accounted (especially in ratios). Thus, it is impossible to dismiss the influence of political and epidemiological factors. The latter exerted both multipositive influence due to increase in online trading [18] and negative influence, such as decrease in overall trading circulation (due to ultra drop in buyer's capacity and decrease in demand). There is the hypothesis about correlation between development of goods circulation sphere and cultural features of various countries and their religions. However, numerous contradictions emerge as a consequence of transition into calculations aimed at confirmation of hypotheses.

The experimental results of Kulyasov N.S., Novik N.N., Klyukin N.D., Charyyarova G.D. [8] are also disputable and reduce the set of reasons of slow technological development of agriculture only to the unavailability of legal base regulating data processing and the lack of governmental measures to support precision agriculture. The authors of this article believe that it is necessary to estimate the impact of factors of production sphere, foreign trade turnover, features of international relations, geographic and climatic factors.

## 6. Conclusion

Digitization and technological development are at present the determining factors of increase in macroeconomic indices in the world. The sphere of goods circulation as a platform of links and concerns of production and consumption is, one of the first segments accepting the conditions of digital evolution. Transformation of all processes in the existing economy is an objective reality. Galloping rates of technological advances, cardinally new technologies of data transfer, accumulation and storage, strategically new approaches to management of national economy became an inherent part of world economies. The increase in e-trading in Russia from 5.3% in 2018 to 21.6% in 2020 determined the influence of the factors of digitization on trading channels. The use of Big Data, Blockchain, Cloud Computing, IoT, AR/VR allows to optimize the trading technology, thus forming new management opportunities of expenses, final goods price, as well as buyer's activity. Herewith, low (21.6% in 2019) and ultra slowly increasing (only by 2 p.p. in comparison with 2011) share of hi-tech products in GDP of the Russian Federation retains acute issues of development of goods circulation sphere under the impact of factors of technological development.

The following indicators have been analyzed: implementation dynamics of hi-tech products into GDP; updating of fixed assets in trading, including those relating to high, medium, and low rates of manufacturability; share of machinery and equipment in overall amount of fixed assets in trading, including those relating to high, medium, and low rates of manufacturability; degree of depreciation of fixed assets in trading, including those relating to high, medium, and low rates of manufacturability; the extent of investments into retrofitting and updating in total investments into fixed assets, depth of investments for machinery and equipment in total fixed assets aimed at retrofitting and updating; statistic factors of science, innovations, and advanced technologies, such as internal expenses for investigations and development in GDP, internal expenses for investigations and development regarding prioritized fields of science, technologies and engineering in total amount of internal expenses for investigations and development; the depth of implementation of engineering innovations; share of innovative goods, works, services in total amount of shipped goods, works, services; coefficient of inventive activity; dynamics of labor efficiency in trading, capital/labor ratio; return on assets in trading; efficiency of resource use in trading accounted for a certain region, including that determined by formed regional statistics; investments into fixed assets aimed at retrofitting and updating; investments into machinery and equipment during retrofitting and updating.

The performed analysis has allowed to formulate expanded presentation of the factors of influence on goods circulation sphere. The following conclusions can be made.

The obtained results, preceding predictions based on the described model, demonstrate negative trend of dynamics of trading turnover under the influence of macroeconomic, political, epidemiological factors in 2020. The predictions are optimistic in this regard; however, they confirm general trend of decrease in buyer's demand.

The research results, including predictions of development of circulation sphere, can be applied in the sphere of governmental regulation of trading, including promotion and support for implementation of advanced technologies for small- and medium-scale entrepreneurship.

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